

Chromaticity jump test at injection

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Outline of the experiment

- Changing the γ_t -quad polarity at injection results in a chromaticity jump
- The jump can be controlled by setting the sextupoles (four families per arc) differently
- This works beautifully in the model
- Does the actual machine match the model?

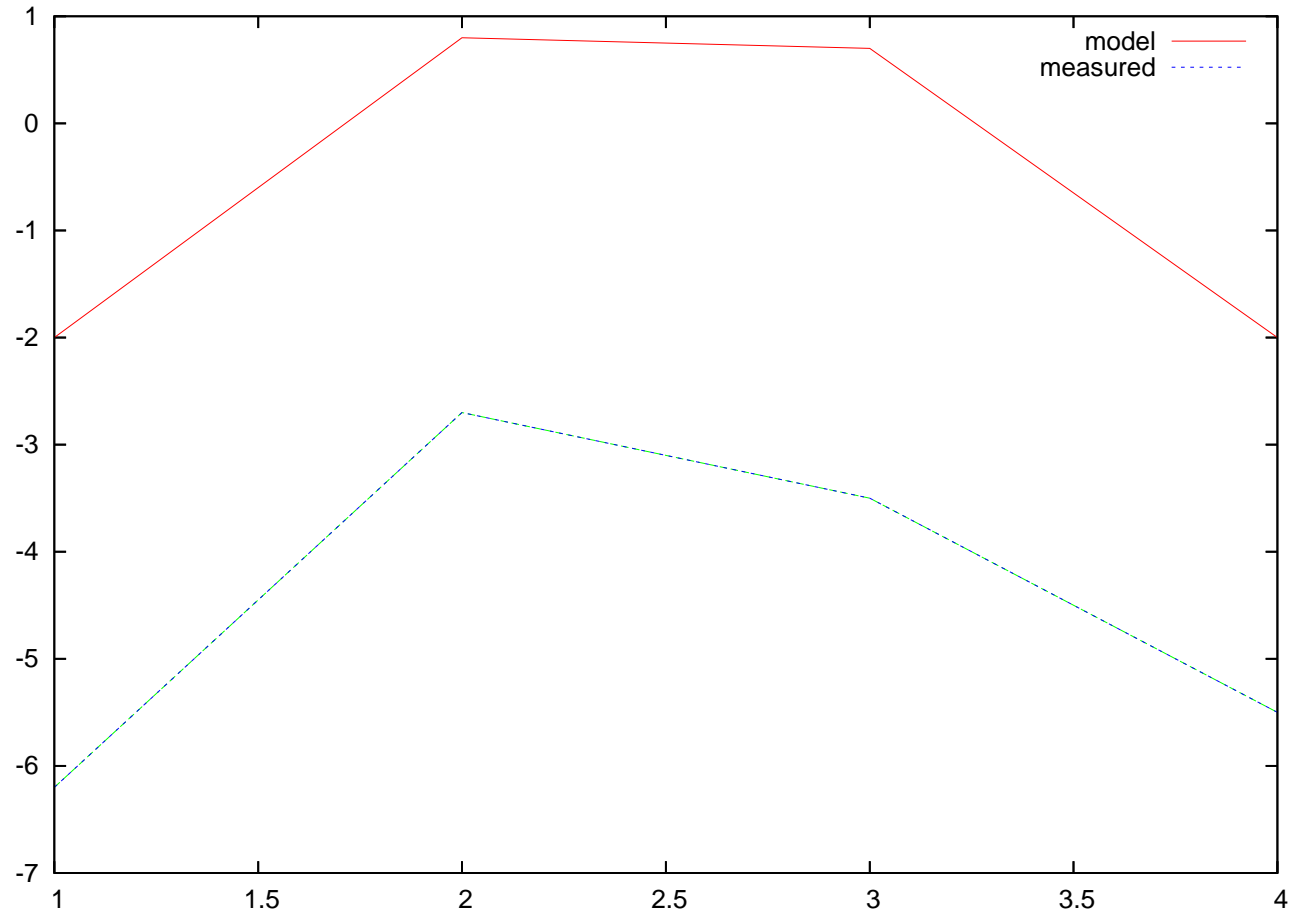
→ Observe chromaticities in model and machine simultaneously

Four steps:

1. Regular sextupole settings, γ_t -quads in “+” polarity
2. Regular sextupole settings, γ_t -quads in “-” polarity
3. Modified sextupole settings, γ_t -quads in “-” polarity
4. Modified sextupole settings, γ_t -quads in “+” polarity

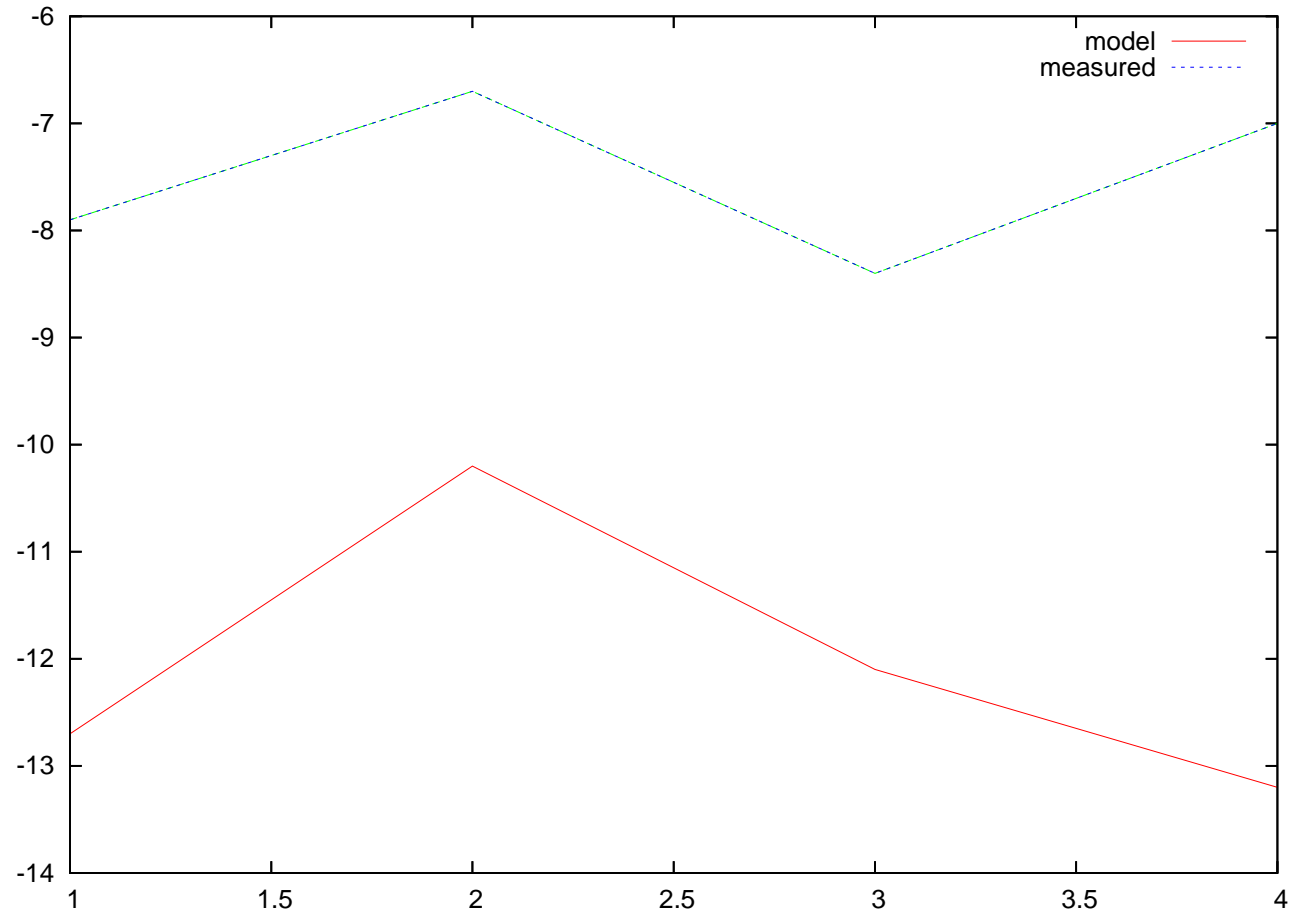
Note: Step 3 to 4 corresponds to a “backwards” chromaticity jump

Vertical chromaticity during the experiment



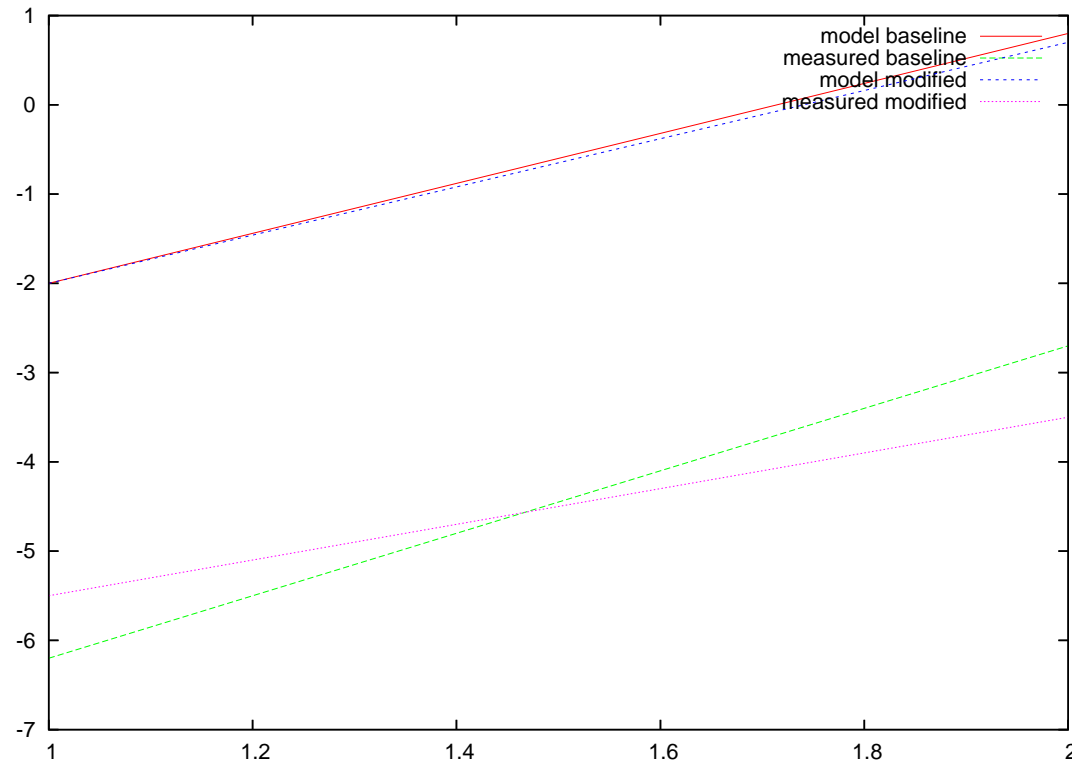
→ Nice agreement between measurements and model

Horizontal chromaticity during the experiment



→ Clear discrepancy for Step 4

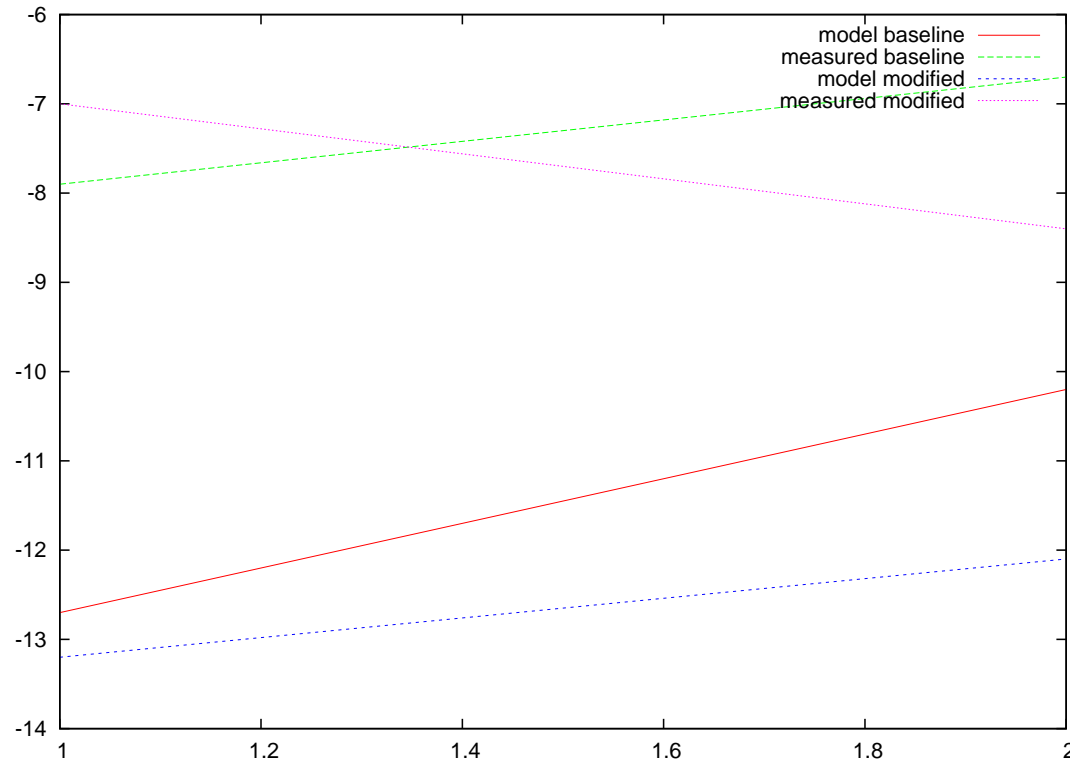
Vertical chromaticity jump



Model: vertical chromaticity jump does not change

Measurement: vertical chromaticity jump gets ≈ 1.5 units smaller with modified sextupoles

Horizontal chromaticity jump



Model: horizontal chromaticity jump gets ≈ 1.5 units smaller
Measurement: horizontal chromaticity jump gets ≈ 2.6 units smaller with modified sextupoles

Conclusion

- Measured discrepancies between model and machine may be due to limited measurement accuracy
- In retrospect, the design chromaticity jump change should have been larger to overcome this limitation
- However, sextupole strengths were calculated a while ago, and should have resulted in a horizontal jump change of -4 units instead of -1.5
- This shows that the chromaticity jump is very sensitive to actual machine settings For a future test, a real “chromaticity jump knob” is desirable